

A Brief Review of Edible oils and its Nutritional properties for a rural Indian

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ABSTRACT:

Edible oils and fats are used daily due to their nutritional value. The nutritional value of edible oils and fats are due to presence of saturated and unsaturated fatty acids. In India, the major intake of fats and oils are through edible oils and hence a proper study is needed to analyse the different health aspects of different edible oils. In this review article the various nutritional values of Sesame oil, Sunflower oil, Coconut oil, Ghee, Mustard oil, Palm oil, Peanut oil and Soya bean oil has been discussed. Fats and oils hold an important key in aetio-pathogenesis of diabetes and dislipidaemia.

Keywords: Edible oils, Nutritional Value

INTRODUCTION

India is one of the largest producers of oilseeds in the world. The oilseeds are cultivated and produced in Central and southern parts of India, mainly in Madhya Pradesh, Gujarat, Rajasthan, Andhra Pradesh and Karnataka. The major oilseeds cultivated in India are groundnut, mustard/rapeseed, sesame, safflower, soyabean and sunflower. Coconut is the most important source of edible oil amongst plantation crops, while in non-conventional oils, rice bran oil and cottonseed oil are the most important. Groundnut, soyabean and mustard together contribute about 85 percent of the country's oilseeds production. The Indian edible oil market is the world's fourth-largest after the USA, China and Brazil. India ranks among the largest producers of oilseeds in the world such as USA, China and Brazil, its productivity is quite low. Three oilseeds: groundnut, soybean and rapeseed/mustard, together account for over 80 per cent of aggregate cultivated oilseeds output. India is a leading player in edible oils, being the world's largest importer and the world's third-largest consumer. Each year, India consumes over 10 million tonnes of edible oils. This is considerably lower than in most developed countries. Palm oil is mainly imported edible oil than any other edible oils and soya bean oil account for almost half of total edible oil consumption in India, followed by mustard and groundnut oil. In India, most vegetable oil is purchased by household or industrial buyers for frying or baking and other purposes. In Indians intake of fats are mainly through intake from edible oils and milk fats. Average daily intake is about 33 mg/day [1]. The present review article is a brief summary about the various aspects including uses of Sesame oil, Sunflower oil, Coconut oil, Ghee, Mustard oil, Palm oil, Peanut oil and Soya bean oil.

SESAME OIL

Sesame oil (also known as gingelly oil and till oil) is an organic oil derived from sesames, noted to have the distinctive aroma and taste of its parent seed. It is often

used in Southeast Asian cuisine as a flavor enhancer, e.g. adding it to instant noodles. Sesame oil is composed of the following fatty acids [1]. Asian sesame oil derives its dark colour and flavour from toasted hulled sesame seeds. It is commonly used in Chinese and Korean cuisine, usually added at the end of cooking as a flavour highlight and not used as a cooking medium (as is, for example, peanut oil). There are many variations in the colour of sesame oil: cold-pressed sesame oil is almost colourless, while Indian sesame oil (gingelly or till oil) is golden and Chinese sesame oil is commonly a dark brown colour. Cold pressed sesame oil has less flavour than the Chinese, since it is produced directly from raw, rather than toasted seeds. Sesame oil is traded in any of the forms described above: Refined sesame oil is very common in Europe and the USA; most margarine is made there from. Cold-pressed sesame oil is available in Western health shops. In most Asian countries, different kinds of hot-pressed sesame oil are preferred [2].

History

Sesame seeds were one of the first crops processed for oil as well as one of the earliest condiments. The addition of sesame seeds to baked goods can be traced back to ancient Egyptian times from an ancient tomb painting that depicts a baker adding the seeds to bread dough. Prior to 600 BC, the Assyrians used sesame oil as a food, salve, and medication, primarily by the rich, as the difficulty of obtaining it made it expensive. Hindus use till oil in votive lamps, and consider the oil sacred. According to Hindu belief, lighting lamp filled with till oil in front of Lord Hanuman removes obstacles and difficulties in life [3].

Manufacturing process

When the fruit capsule opens, it releases a real treasure - the sesame seeds. However, a great deal of manual work is necessary before this point is reached. That is why sesame is hardly ever cultivated in western industrialised agricultural areas [4]. The sesame seeds are protected by a capsule, which does not burst open

until the seeds are completely ripe. The ripening time tends to vary. For this reason, the farmers cut plants by hand and place them together in upright position to carry on ripening for a few days. The seeds are only shaken out onto a cloth after all the capsules have opened. The discovery of an indehiscent (nonshattering) mutant by Langham in 1943 began the work towards development of a high yielding, shatter-resistant variety. Although researchers have made significant progress in sesame breeding, harvest losses due to shattering continue to limit domestic US production [5]. Currently sesame is being imported in the US at a price of 43 cents/lb. This relatively high price reflects a world-wide shortage. Though the market for sesame seed is strong, domestic US production awaits the development of high-yielding nonshattering varieties. It is advisable to establish a market before planting.

Uses

Sesame oil's popularity in Asia particularly in South Indian state of Tamil Nadu can be likened to olive oil's popularity in the mediterranean. Its main uses are listed below,

1. **Cooking.** Sesame oil carries a premium relative to other cooking oils and is considered more stable than most vegetable oils due to antioxidants in the oil [6]. Sesame oil is least prone, among cooking oils, to turn rancid. This is because it has a very high boiling point. In effect, sesame oil retains its natural structure and doesn't break down even when heated to a very high temperature.
2. **Body Massage** Sesame oil is reputed for its ability to penetrate the skin easily. Sesame oil is immensely popular in India where it's used in oil massage.
3. **Hair Oil.** Applying Sesame oil for the hair is believed to result in darker hair. It is also recommended for Hair and Scalp massage [7].

Vitamins and Minerals

Sesame oil is a good source of Vitamin E [8]. Vitamin E is an anti-oxidant which means it helps lower cholesterol. As with most plant based condiment, sesame oil contains magnesium, copper, calcium, iron, zinc and vitamin B6. Copper Provides Relief for Rheumatoid Arthritis. Magnesium Supports Vascular and Respiratory Health. Calcium Helps Prevent Colon Cancer, Osteoporosis, Migraine and PMS. Zinc promotes Bone Health. Besides being rich in Vitamin E, there is insufficient research on the medicinal properties of sesame oil. However, the following claims have been made.

SUNFLOWER OIL

Sunflower oil is the non-volatile oil expressed from sunflower (*Helianthus annuus*) seeds. Sunflower oil is

commonly used in food as frying oil, and in cosmetic formulations as an emollient.

Chemical structure

Sunflower oil contains predominantly linoleic acid in triglyceride form. The British Pharmacopoeia lists the following profile:

- Palmitic acid : 4 - 9%,
- Stearic acid : 1 - 7%,
- Oleic acid : 14 - 40%,
- Linoleic acid : 48 - 74%.

There are several types of sunflower oils produced, such as high linoleic, high oleic and mid oleic. High linoleic sunflower oil typically has at least 69% linoleic acid. High oleic sunflower oil has at least 82% oleic acid. Variation in fatty acid profile is strongly influenced by both genetics and climate [9].

Sunflower oil also contains lecithin, tocopherols, carotenoids and waxes. Sunflower oil's properties are typical of vegetable triglyceride oil. Sunflower oil is produced from oil type sunflower seeds. Sunflower oil is light in taste and appearance and has a high Vitamin E content. It is a combination of mono-unsaturated and polyunsaturated fats with low saturated fat levels.

Physical properties

Sunflower oil is liquid at room temperature. The refined oil is clear and slightly amber-colored with a slightly fatty odor.

Uses

As frying oil, sunflower oil behaves as a typical vegetable triglyceride. In cosmetics, it has smoothing properties and is considered non-comedogenic. Only the high-oleic variety possesses shelf life sufficient for commercial cosmetic formulation. Sunflower oil's INCI name is *Helianthus annuus* (Sunflower) Seed Oil.

Health benefits

There is a variety of health benefits associated with the consumption of sunflower oil.

Diet and cardiovascular benefits

Sunflower oil is high in the essential vitamin E and low in saturated fat. The two most common types of sunflower oil are linoleic and high oleic. Linoleic sunflower oil is common cooking oil that has high levels of the essential fatty acids called polyunsaturated fat. It is also known for having a clean taste and low levels of trans fat. High oleic sunflower oils are classified as having monounsaturated levels of 80% and above.

Newer versions of sunflower oil have been developed as a hybrid containing linoleic acid. They have

monounsaturated levels lower than other oleic sunflower oils. The hybrid oil also has lower saturated fat levels than linoleic sunflower oil [10]. Sunflower oil of any kind has been shown to have cardiovascular benefits as well. Diets combined with a low fat content and high levels of oleic acid have been suggested to lower cholesterol which, in turn, results in a smaller risk of heart disease.

Restaurant and food industry uses

Restaurants and food manufacturers are becoming aware of the health benefits of sunflower oil. The oil can be used in conditions with extremely high cooking temperatures. It may also help food stay fresher and healthier for longer periods of time. Food manufacturers are starting to use sunflower oil in an effort to lower the levels of trans-fat in mass produced foods [11].

COCONUT OIL

Coconut oil, also known as coconut butter, is tropical oil with many applications. Coconut oil constitutes seven percent of the total export income of the Philippines, the world's largest exporter of the product.

Physical properties

Coconut oil is a fat consisting of about 90% saturated fat. The oil contains predominantly medium chain triglycerides with roughly 92% saturated fatty acids, 6% monounsaturated fatty acids, and 2% polyunsaturated fatty acids. Of the saturated fatty acids, coconut oil is primarily 44.6% lauric acid, 16.8% myristic acid and 8.2% palmitic acid, although it contains seven different saturated fatty acids in total. Its only monounsaturated fatty acid is oleic acid while its only polyunsaturated fatty acid is linoleic acid [12].

Unrefined coconut oil melts at 24-25°C (76°F) and smokes at 170°C (350°F) while refined coconut oil has a higher smoke point of 232°C (450°F).

Types of oil available

Unrefined coconut oil (Virgin Coconut Oil VCO)

This is coconut oil is derived from fresh coconuts, not copra, and has not undergone the RBD (refined, bleached, deodorized) process that refined coconut oil derived from copra goes through.

Almost all of the unrefined coconut oils on the market being marketed as "Virgin" are produced one of two ways:

1. Quick drying of fresh coconut meat which is then used to press out the oil. Using this method, the coconut meat is quick dried, and the oil is then pressed out via mechanical means.

2. Wet-milling. With this method the oil is extracted from fresh coconut meat without drying first. "Coconut milk" is expressed first by pressing. The oil is then further separated from the water. Methods which can be used to separate the oil from the water include boiling, fermentation, refrigeration, enzymes and mechanical centrifuge.

Refined oil

Refined coconut oil is referred to in the coconut industry as RBD (refined, bleached, and deodorized) coconut oil. The starting point is "copra", the dried coconut meat. Copra can be made by smoke drying, sun drying, or kiln drying. The unrefined coconut oil extracted from copra (called "crude coconut oil") is not suitable for consumption and must be refined.

Hydrogenated oil

Hydrogenated coconut oil may either be fully or partially hydrogenated. This happens mostly in tropical climates, since the natural melting point of coconut oil is about 76 degrees F, and already naturally a solid in colder climates.

Applications

Cooking

Coconut oil is commonly used in cooking, especially when frying, and it has a high smoke point which makes it good for this purpose. In communities where coconut oil is widely used in cooking, the refined oil is the one most commonly used.

Cosmetics and skin treatments

Coconut oil is excellent as a skin moisturizer. A study shows that extra virgin coconut oil is as effective and safe as mineral oil when used as a moisturiser, with absence of adverse reactions. Although not suitable for use with condoms, coconut oil is an excellent, inexpensive lubricant for sexual intercourse. Before coconut oil is used as a sexual lubricant, however, it is recommended to do an allergy test.

In diesel engines

Coconut oil has been tested for use as a feedstock for biodiesel to be used as a diesel engine fuel. In this manner it can be applied to power generation and transport using diesel engines. Coconut oil is blended to make biodiesel but can also be used straight, without blending. However, only blends with 10% or less of coconut oil can be safely used in unmodified engines. The oil needs to meet the Weihenstephan standard for pure vegetable oil used as a fuel since otherwise moderate to severe damage from coking and clogging will occur in an unmodified engine [13].

Ghee

Ghee is a class of clarified butter that originates in the Indian subcontinent, and continues to be important in

Indian cuisine as well as Egyptian cuisine. Ghee is made by simmering unsalted butter in a large pot until all water has boiled off and protein has settled to the bottom. The cooked and clarified butter is then spooned off to avoid disturbing the milk solids on the bottom of the pan. Unlike butter, ghee can be stored for extended periods without refrigeration, provided it is kept in an airtight container to prevent oxidation and remains moisture-free [14].

Preparation of Ghee

Milk is curdled. The curd is then manually churned until it precipitates butter and leaves behind some whey. The butter is then heated on a low flame until a layer of white froth covers the surface. This state indicates the end of process and the liquid obtained on filtering the suspension is pure ghee.

Nutrition and health concerns

Studies in Wistar rats have revealed one mechanism by which ghee reduces plasma LDL cholesterol. This action is mediated by an increased secretion of Biliary Lipids. The Nutrition facts label found on bottled cow's ghee produced in the USA indicates 8mg of cholesterol per teaspoon. Vegetable ghee is actually polyunsaturated or monounsaturated partially hydrogenated vegetable oil, a trans-fat.

Trans-fats are increasingly linked to serious chronic health conditions. Not only is "vegetable ghee" implicated in causing high LDL Low Density Lipid, it also lacks the health-promoting benefits for ghee. When cooking, it can be unhealthy to heat polyunsaturated oils such as vegetable oils to high temperatures. Doing so creates peroxides and other free radicals.

These substances lead to a variety of health problems and diseases. On the other hand, ghee has a very high burning point and doesn't burn or smoke easily during cooking. Because ghee has the more stable saturated bonds (i.e., it lacks double bonds which are easily damaged by heat) it is not as likely to form the dangerous free radicals when cooking.

MUSTARD OIL

Mustard oil is used for two different oils that are made from mustard seeds:

- a fatty vegetable oil resulting from pressing the seeds,
- an essential oil resulting from grinding the seeds, mixing them with water, and extracting the resulting volatile oil by distillation.

Mustard oil from pressed seeds

This oil has a strong smell, a little like strong cabbage, a hot nutty taste, and is much used for cooking. The oil makes up about 30% of the mustard seeds. It can be

produced from black mustard (*Brassica nigra*), brown Indian mustard (*Brassica juncea*), and white mustard (*Brassica hirta*). Mustard oil is composed mostly of the fatty acids oleic acid, linoleic acid and erucic acid. At 5%, mustard seed oil has the lowest saturated fat content of the edible oils. In North India, mustard oil is also used for rub-downs and massages. Massage with the oil is thought to improve blood circulation, muscular development and good texture to human skin; the oil is also antibacterial [15].

PALM OIL

Palm oil is a form of edible vegetable oil obtained from the pulp of fruit of the oil palm tree. Palm oil is high in saturated fatty acids. The palm fruit is the source of both palm oil (extracted from palm fruit) and palm kernel oil (extracted from the fruit seeds). Palm oil itself is reddish because it contains a high amount of beta carotene [16].

Chemical composition

Palm oil consists of saturated fats such as glyceryl laurate, myristate, palmitate and stearate and unsaturated fats such as oleate, linoleate and linolenate [17]. Palm oil and palm kernel oil are composed of fatty acids, esterified with glycerol just like any ordinary fat. Both are high in saturated fatty acids, about 50% and 80%, respectively.

The oil palm gives its name to the 16 carbon saturated fatty acid palmitic acid found in palm oil; monounsaturated oleic acid is also a constituent of palm oil while palm kernel oil contains mainly lauric acid. Palm oil is the largest natural source of tocotrienol, part of the vitamin E family. Palm oil is also high in vitamin K and dietary magnesium.

Palm Oil as Biodiesel

Palm oil, like other vegetable oils, can be used to create biodiesel for internal combustion engines. Biodiesel has been promoted as a form of biomass that can reduce net emissions of carbon dioxide into the atmosphere. However, recent thinking has suggested that bio-fuels may not be a very effective counter to global warming [18]. Palm oil has a comparatively high yield; the many problems linked to oil palm cultivation have encouraged research into alternative vegetable fuel oil sources with less potential for environmental damage, such as jatropha.

Health

Palm oil, despite being the most used vegetable oil for cooking, their heavy use nonetheless in the commercial food industry can thus only be explained by its comparatively low price, being one of the cheapest vegetable or cooking oils on the market. Red palm oil, when compared to regular palm oil however, has been found to be healthier.

PEANUT OIL

Peanut or groundnut oil (*Arachis* oil) is an organic oil derived from peanuts, noted to have the slight aroma and taste of its parent legume, it is marketed as Groundnut Oil. Peanut oil is most commonly used when frying foods, particularly French fries and chicken. Commercial peanut oil will not cause an allergic reaction because the allergen is a protein, not a fat; however, the cold pressed and organic oils will. They are presumably less filtered, retaining some peanut proteins for the sake of flavor and nutrition [19].

SOYBEAN OIL

Soybean oil, the soybeans are cracked, adjusted for moisture content, rolled into flakes and solvent-extracted with commercial hexane. The oil is then refined, blended for different applications, and sometimes hydrogenated. Soybean oils, both liquid and partially hydrogenated, are exported abroad, sold as "vegetable oil," or end up in a wide variety of processed foods. The remaining soybean husks are used mainly as animal feed. The major unsaturated fatty acids in soybean oil triglycerides are 7% linolenic acid (C18:3); 51% linoleic acid (C-18:2); and 23% oleic acid (C-18:1). It also contains the saturated fatty acids 4% stearic acid and 10% palmitic acid [20].

CONCLUSION

India being a developing country, many Indians particularly those living in the rural sectors cannot able to purchase the health products and it will be of immense value, if any daily recipe is of health benefits. Fats and oils particularly saturated fats, are be considered unhealthy and disease provoking. A large percentage of daily consumption of fats and oils in Indians is through edible oils and hence a proper study is needed to analyse the different health aspects of different edible oils in India. In this review article we mentioned some of the health benefits of commonly using oils and fats in our daily life.

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